

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A projection optical system which ~~magnifies and projects a luminous flux from~~ final image of an original image onto a projection surface ~~oblique to a central principal ray which is a principal ray of a center light flux traveling from the center of the original image to the center of a projected image plane~~, the projection optical system comprising:

a refractive optical system which includes a plurality of refractive optical elements ~~through which the luminous flux from the original image passes through~~; and

a reflective optical system which includes a plurality of reflective surfaces ~~and guides the luminous flux emerging from the refractive optical system to the projection surface~~, each of the reflective surfaces having an optical power,

wherein ~~the projection optical system forms an intermediate image of the original image at a position different from the projection surface~~ an image light from the original image is incident on the reflective optical system through the refractive optical system,

a central principal ray is oblique to the projection plane, where the central principal ray is a principal ray of a light flux incident on the center of the final image projected onto the projection plane, and

the following condition is satisfied:

$$57.05 \leq f_a \leq 98.85$$

where f_a represents a focal length of the refractive optical system.

2. (Previously Presented) The projection optical system according to claim 1, wherein the intermediate image of the original image is formed within the reflective optical system.

3. (Currently Amended) The projection optical system according to claim [[1]] 2, wherein at least one of optical surfaces each having an optical power disposed immediately before and after the position where the intermediate image is formed is a reflective surface.

4. (Currently Amended) The projection optical system according to claim [[1]] 2, wherein an optical surface having an optical power closest to the position where the intermediate image is formed is a reflective surface.

5. (Currently Amended) The projection optical system according to claim 1, wherein the following ~~condition~~ expression is satisfied:

$$|f_a/f| > 2$$

where f_a represents a focal length of the refractive optical system and f represents a focal length of the projection optical system in a longitudinal direction of the projection ~~surface~~ plane.

6. (Original) The projection optical system according to claim 1, wherein at least one of the reflective surfaces is a rotationally asymmetric surface.

7. (Currently Amended) The projection optical system according to claim [[1]] 2, wherein at least one of optical surfaces each having an optical power disposed immediately before and after the position where the intermediate image is formed has an asymmetric optical power in azimuthal directions of 0 and 90 degrees.

8. (Currently Amended) The projection optical system according to claim [[1]] 2, wherein each of optical surfaces each having an optical power disposed immediately before and after the position where the intermediate image is formed is shaped in azimuthal directions of 0 and 90 degrees such that the surface has a concave shape toward each of the azimuthal directions when the refractive optical system has negative curvature of field.

9. (Currently Amended) The projection optical system according to claim [[1]] 2, wherein each of optical surfaces each having an optical power disposed immediately before and

after the position where the intermediate image is formed is shaped in azimuthal directions of 0 and 90 degrees such that the surface has a convex shape toward each of the azimuthal directions when the refractive optical system has positive curvature of field.

10. (Currently Amended) The projection optical system according to claim 1, wherein a normal line to a surface of the original image is substantially perpendicular to a normal line to the projection ~~surface~~ plane.

11. (Currently Amended) The projection optical system according to claim 1, wherein an optical axis of the refractive optical system is substantially perpendicular to a normal line to the projection ~~surface~~ plane.

12. (Original) The projection optical system according to claim 11, wherein the optical axis of the refractive optical system is substantially parallel to a normal line to a plane including a reference axis which is an optical path of the central principal ray within the reflective optical system.

13. (Original) The projection optical system according to claim 11, wherein the optical axis of the refractive optical system is substantially perpendicular to a normal line to a plane including a reference axis which is an optical path of the central principal ray within the reflective optical system.

14. (Currently Amended) A projection type image display apparatus comprising:
an image forming element which forms an original image; and
a the projection optical system according to claim 1, which ~~magnifies and projects [a]~~
luminous flux from ~~an~~ the original image onto a projection ~~surface oblique to a central principal~~
~~ray which is a principal ray of a center light flux traveling from the center of the original image~~
~~to the center of a projected image,~~
~~wherein the projection optical system comprises:~~

~~—— a refractive optical system which includes a plurality of refractive optical elements through which the luminous flux from the original image passes through; and~~
~~—— a reflective optical system which includes a plurality of reflective surfaces and guides the luminous flux emerging from the refractive optical system to the projection surface, each of the surfaces having an optical power;~~
~~—— wherein the projection optical system forms an intermediate image of the original image at a position different from the projection surface plane.~~

15. (Currently Amended) The projection type image display apparatus according to claim 14, further comprising a plane reflective surface provided on an optical path from the reflective optical system to the projection surface plane.

16. (Original) An image display system comprising:
the projection type image display apparatus according to claim 14, and
an image information supply apparatus which supplies image information for displaying an original image on the image forming element to the projection type image display apparatus.

17. (Currently Amended) The projection type image display apparatus optical system according to claim 14 5, wherein the following condition is satisfied:

$$|f_a/f| > 2.468$$

where f_a represents a focal length of the refractive optical system and f represents a focal length of the projection optical system in a longitudinal direction of the projection surface plane.

Claims 18–22 (Canceled)